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ABSTRACT

This document explores the planning, programming, and budgeting system concept. Emphasis is placed on the establishment of a coding structure, the impact of timing, the impact of course decisions on resource utilization, the impact of course decisions on space utilization, and the 12 College Cost Quality Study. (MJM)

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# MAKING THE MOST OF INSTITUTIONAL RESOURCES

By Thomas E. Tellefsen
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*The following paper was delivered by Mr. Tellefsen on March 12, 1973, at the Twelfth Biennial Workshop of the Eastern Association of College and University Business Officers. The workshop, conducted at the Chalfonte-Haddon Hall in Atlantic City, was organized around the theme, "The Business Office—No Place for Amateurs."*

THE NEED TO MANAGE institutions more effectively is not only a matter of good business practice, but for many colleges and universities it may very well be a matter of survival. During the past few years, it has been difficult to pick up a paper or magazine without finding an article dealing with the financial crisis in education. That the crisis is real is not in question. That the investment of additional resources will eliminate the crisis does seem to be in question. That the additional investment, if made, will be used wisely is also in question.

Those who are being asked to provide institutional resources are beginning to seek additional and more uniform information regarding the utilization of available resources. There is present also the evolution of a greater degree of central planning and an expanded role for resource allocation agencies. These developments forebode the growth of a stronger voice in decision-making for those who provide the resources being sought by educational institutions.

There are many areas of institutional activity that could and should be considered in relation to resource maximization. To do justice to the entire range of possibilities would require a more lengthy treatment than is possible within the limitations of this paper. I have chosen the two following areas for my analysis of the techniques that can be applied to reduce the cost or increase the effectiveness of programs, services and other institutional activities:

1) Structuring data systems to provide information required for resource utilization evaluation; and
2) Techniques that can be employed to evaluate instructional activities.

Academic activities are chosen as a primary area to be explored not only because they represent such a large component of institutional operations, but also because they include, in my opinion, the greatest future potential for better resource utilization. The academic sphere also represents the area of operation with which the business officer may be least familiar.

Colleges and universities should, and will, look to their business officers to provide the information required to move in directions that will preserve the independence of higher education systems and the maintenance of fiscal solvency. Business officers, therefore, must have information systems organized to provide management with timely and accurate data that is both relevant to the decision being considered and aggregated to the level of detail required by the user.

### *Planning, Programming and Budgeting*

During recent years, a considerable effort has been devoted to the development of information systems which will accomplish the above-stated objectives. Planning, Programming and Budgeting Systems has received a great deal of attention during this period. Because of the emphasis given PPBS and the necessity to organize data properly for more effective

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management, I would like to explore the PPBS concept in greater detail.

PPBS is a system that attempts to ascertain where an institution should be going and the most effective means of getting there, as well as monitoring progress being achieved in doing so. As can be seen from Figure I, these objectives translate into the three basic functions of management -planning, budgeting, and evaluation and control.

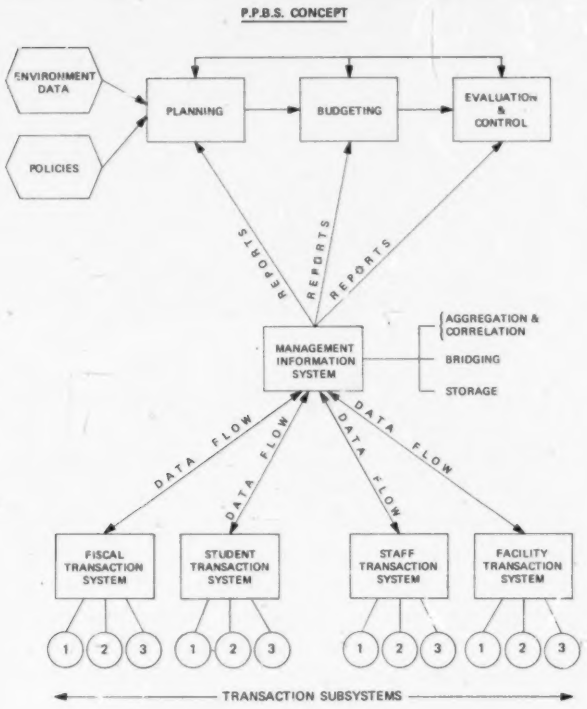


FIGURE I

Management needs data in order to perform these functions properly. Part of the data required comes from sources external to the institution's record keeping systems. Such data includes environmental and institutional policy information. Examples of environmental data are cost of living, cost of construction, enrollment projections, and funding projections. Examples of institutional policy data include the definition of FTE faculty and students, institutional calendar, and benefit policies. Other data, appropriately aggregated, flows in the form of reports generated from institutional record keeping or transaction systems. Each institution, regardless of format, maintains the same types of transaction systems. These include fiscal records, student records, staff records, and facility records. Each of these record systems, of course, has a number of subsystems.

Implementation of a PPB System requires the establishment of a Management Information System (MIS). The MIS performs the three following primary functions:

1) The aggregation and correlation of data in a manner required to generate reports which are meaningful to management in performing the functions of planning, budgeting, and evaluation and control;
2) The bridging of data, where electronic data processing is involved, to minimize the necessity to record common elements of data in more than one data bank. Personnel data required for payroll purposes is one classic example; and
3) The storage of historical data for comparative reporting and reference purposes.

For the Management Information System to function effectively, careful thought has to be given to reporting requirements, both internal and external. From this, one can formulate a coding structure that assures uniformity of data identification among data banks and permits aggregation for each level of management. When the MIS involves the bridging of data elements between or among transaction systems, the most accurate source of such data and how the bridging activity will be accomplished must be identified.

*Establishing a Coding Structure*

Perhaps the most effective way of establishing a coding structure which meets the needs of other transaction systems, should one desire to do so, is to start with the fiscal control system. This approach results from the belief that the fiscal control system, if it performs its function effectively, embodies all the organizational and programmatic elements of institutional operation. If one looks at the coding concept that might emerge from such an approach, one would be dealing with not less than four nor more than five coding fields. These fields are:

1) *Fund Group*—In accordance with CUBA (1968), to encompass Current Unrestricted, Current Restricted, Endowment, Loan, Plant (with four sub-groups), and Agency Funds;
2) *Project or Responsibility Group*—Depending upon fund group involved, such identification as is necessary to segregate reporting to appropriate individuals or projects;
3) *Program Identification*—In accordance with WICHE (NCHEMS) program structure or such

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other program identification as may be desired or appropriate;

4) *Element of Expense*—To provide identification of type of expenditure involved; and
5) *Location*—If required, for either multi-campus or building identification.

It is my belief that this type of coding structure allows appropriate reporting correlations for student, staff, and facility data by utilizing the field for Element of Expense in the fiscal data files for statistical or profile data in the other data bank. This type of transaction coding is consistent with the basic concepts of WICHE (NCHEMS) except for the important concept of Responsibility Reporting identification.

There is some doubt concerning whether or not transaction processing systems are either the most economical or the most efficient approaches that an institution could employ. As an alternative, one might consider a cost allocation process to be more economical and an approach that will produce equally accurate results.

*The Impact of Timing*

Another aspect of the PPBS concept that needs to be explored in relation to resource allocation and utilization is the impact of timing. It has been said that it is easier to relocate a graveyard than it is to effect change within a college or university. The rationale behind such a statement relates to a number of factors, one of which is the timing element involved in instructional decisions concerning, for example, course offerings, student recruitment, catalogue preparation, staffing, and budgets.

An analysis of timing aspects, as illustrated in Figure II, reveals that the process of implementing academic change for fiscal year 1975-76 must begin in the spring of 1973. One must allow time for the required academic deliberation, the process of preparing and printing the catalogue, staffing decisions dealing with retention, promotion, compensation, and recruitment, recruitment activities, and the enrollment and registration procedures. When required course changes finally complete the process, one is dealing with a timetable which begins in the spring of 1973 and culminates in the fall of 1975.

How is this timetable pertinent to the topic, "Making the Most of Institutional Resources"? Its pertinence is derived from the following interrelationships:

1) Instructional costs are the largest single component of operating costs;
2) Faculty salaries are the largest component of instructional costs;
3) The number and types of faculty are dictated by decisions concerning program and course offerings, the size of sections, and teaching loads; and
4) Program and course offering decisions also influence things such as space utilization and support service activities.

Thus, program and curriculum decisions, usually made far in advance of the school year, have a profound effect on institutional costs.

Under ideal conditions, program and course offering decisions would be related to enrollment projections and trends in student demands for instruction. Alternatively, recruitment, admissions, and financial aid activities should be directed toward the attraction and retention of students to match program and course decisions. Either would result in resource maximization. Unfortunately, however, one seldom finds either set of relationships in force.

The NACUBO publications, *Planning, Budgeting, and Accounting* and *A Student Records Manual,* both recognize the resource utilization impact of program and course decisions. *Planning, Budgeting, and Accounting* calls for academic planning to precede support service planning. It further requires departments to specify courses to be offered, section sizes, projected

enrollments for each course section, and the required faculty based on the percentage of full-time load assigned to each course. *A Student Records Manual* begins with the premise that an academic plan—the specification of programs and courses, and enrollments related to each—has been developed. The first task then assigned the admissions and financial aid officers is the development of a coordinated plan identifying how resources will be employed to obtain the projected enrollment on which the academic plan has been based.

*The Impact of Course Decisions On Resource Utilization*

The following techniques can be employed to evaluate the impact of course decisions on resource utilization. They are simple techniques, and, in the examples chosen, are used in relation to the institution as a whole. However, they can be applied equally well on a school, division, or department basis.

**Example A: Faculty Staffing**

The following assumptions are made:

1) A college offers 250 courses or sections;
2) Each course or section is equal to 3 clock-hours;
3) A full-time teaching load is equal to 12 clock-hours; and
4) Administration duties and committee assignments require one-sixth (16.67 percent) of faculty time.

These assumptions result in calculations revealing that:

1) 250 course/sections at 3 clock-hours equals 750 clock-hours of teaching time required to meet all courses and sections;
2) 750 clock-hours of teaching time divided by 12 clock-hours as a full-time load generates a need for 62.5 FTE faculty;
3) A 16.67 percent override on FTE faculty to provide time for non-teaching tasks generates a need for 12.5 FTE faculty; and
4) 250 course/sections generate a need for 75 FTE faculty.

Of course, there will be variances among departments which will change this figure of 75 FTE faculty. This technique, however, provides a quick overview that can be compared with actual conditions to ascertain whether an institution has a faculty staffing problem and, if so, the magnitude of the problem.

**Example B: Section Sizing**

The following assumptions apply in this example:

**SAMPLE TIMETABLE RELATIVE TO ACHIEVING ACADEMIC CHANGE TO BE IMPLEMENTED IN FISCAL 1975–76**

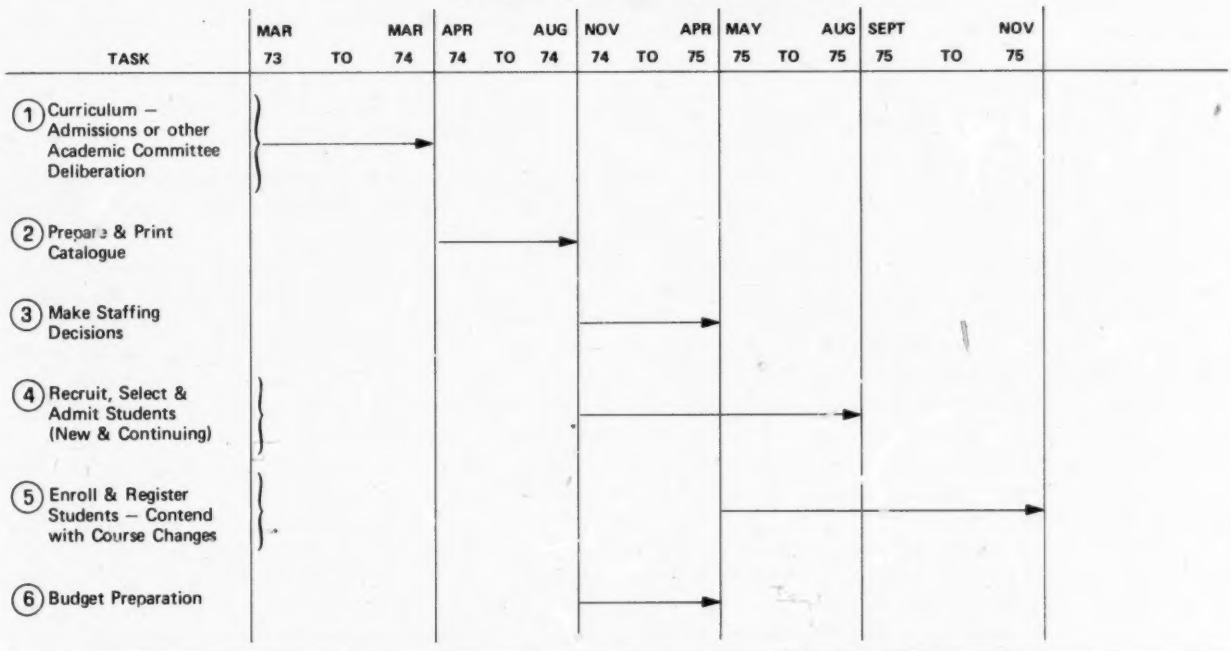
TASK
MAR 73 TO MAR 74
APR 74 TO AUG 74
NOV 74 TO APR 75
MAY 75 TO AUG 75
SEPT 75 TO NOV 75
1 Curriculum – Admissions or other Academic Committee Deliberation
2 Prepare & Print Catalogue
3 Make Staffing Decisions
4 Recruit, Select & Admit Students (New & Continuing)
5 Enroll & Register Students – Contend with Course Changes
6 Budget Preparation

FIGURE II

| TEACHING CLOCK-HOURS | (X) | SECTION SIZE | = | REQ. STUDENT CLOCK-HOURS | (÷) | FTE STUDENT LOAD | = | FTE ENROLLMENT REQUIRED |
|---|---|---|---|---|---|---|---|---|
| 750 | | 20 | | 15,000 | | 15 | | 1,000 |
| 750 | | 25 | | 18,750 | | 15 | | 1,250 |
| 750 | | 30 | | 22,500 | | 15 | | 1,500 |

FIGURE III

1) The college offering the 250 courses or sections desires an average section size of either 20, 25, or 30;
2) A clock-hour is the equivalent of a credit;
3) 120 credits are required for a degree; and
4) The required 120 credits are obtained over 8 semesters, thereby requiring an FTE student to carry 15 credits per semester.

These assumptions result in the calculations shown in Figure III above. Again, there will be variances among departments. If, however, an institution considers a certain average section size to be economically desired or required, this technique provides an overview of required enrollment.

**Example C: Costs and Revenues**

The following assumptions are made:

1) FTE faculty salaries average $12,000;
2) Each FTE faculty member generates the need for an additional support service employee;
3) Support service salaries average $8,000;
4) Salary costs are equal to 50 percent of total Education and General costs;
5) Tuition is $2,000 per FTE student; and
6) 20 percent of tuition revenue is earmarked for unfunded scholarship support.

These assumptions result in the following calculations:

1) Education and General Costs

| | |
|---|---|
| a) 75 FTE Faculty at $12,000 | $ 900,000 |
| b) 75 Support Service Staff at $8,000 | 600,000 |
| c) Total Salaries | $1,500,000 |
| d) Other Costs | 1,500,000 |
| e) Total E and G Costs | $3,000,000 |

2) Tuition Revenues

a) At Average Section Size of 20

| | |
|---|---|
| 1,000 FTE Students at $2,000 | $2,000,000 |
| Less 20 percent for Scholarships | 400,000 |
| Net Revenue | $1,600,000 |

b) At Average Section Size of 25

| | |
|---|---|
| 1,250 FTE Students at $2,000 | $2,500,000 |
| Less 20 percent for Scholarships | 500,000 |
| Net Revenue | $2,000,000 |

c) At Average Section Size of 30

| | |
|---|---|
| 1,500 FTE Students at $2,000 | $3,000,000 |
| Less 20 percent for Scholarships | 600,000 |
| Net Revenue | $2,400,000 |

These types of calculations illustrate the economic impact of course offering and section sizing decisions on staffing and cost, as well as their relationship to required enrollment and revenues.

*The Impact of Course Decisions On Space Utilization*

Course offering and section size decisions also are influences on space utilization. Instructional space utilization usually is expressed either as a percentage of space availability or as a percentage of student station availability. For example, assuming that this same college has 30 classrooms available and that its operation is limited to an eight-hour day, five days per week, calculations reveal that:

1) 250 course sections taught three times per week would generate a demand, as has been illustrated before, for 750 hours of classroom use;
2) 30 classrooms available eight hours per day, five days per week, results in 1,200 hours of classroom availability; and
3) Space utilization would then be expressed as being 62.5 percent which, incidentally, is not a bad percentage for room utilization.

On the other hand, if one assumes that student stations available average out to 30 per classroom, and utilization is computed based on section sizes of 20, 25, and 30, one would find that:

1) 1,200 hours of classroom availability, at 30 student stations each, yields 36,000 student stations available per week;
2) 750 hours of classroom use, at 20 students per course or section, generates a need for 15,000 student station hours per week, resulting in a student station utilization rate of 41.6 percent;
3) If the section size is increased to 25, the utilization rate increases to 52.1 percent; and
4) If the section size is increased to 30, the utilization rate is back to 62.5 percent.

If calculations of this type were properly presented to academic administrators, there would be a greater appreciation of the economic impact of program or curriculum decisions under consideration.

What has been considered up to this point is the interrelationship of data, and the application of data to resource application or utilization decisions. The data correlations used in the above examples are similar to those utilized in developing a simulation model. In developing a simulation model, one must consider the interaction of data, the selection of those elements which are controllable from a decision-making point of view, and the type of output information required to reflect the operational and financial impact of alternative decisions. There are two advantages to simulation as a technique. They are:

1) The ability to evaluate the impact of proposed changes on all aspects of an operation simultaneously; and
2) The identification of the type of data structure required to provide the type of information management requires.

*The Twelve College Cost-Quality Study*

In concluding discussion of program evaluation techniques related to resource maximization, let me try to summarize the potential impacts of the type of academic decisions considered up to this point. In doing so, I will cite some materials from a report entitled "The Twelve College Cost-Quality Study," dated January, 1972, and prepared by McKinsey and Company, Inc. This study involved twelve institutions which are described as being "high expectation" (quality) institutions.

Among the areas of operation covered in the study was "Instruction and Departmental Research." Some of the more significant findings, in my opinion, were:

1) **Instruction and Departmental Research Expenditures Per Course Enrollment**

| *Average Cost Per Cost Enrollment* | *High* | *Median* | *Low* |
|---|---|---|---|
| Overall | $229 | $139 | $ 96 |
| By Division: | | | |
| Humanities | $215 | $131 | $ 95 |
| Social Science | $173 | $ 94 | $ 77 |
| Science and Math | $613 | $163 | $113 |

In evaluating the reasons for such cost variances, it was ascertained that "faculty workloads, as expressed in course enrollments per FTEF (Full-Time Equivalent Faculty), were inversely proportional to the costs per course enrollment shown."

2) **Number of Courses Offered**

| Total Liberal | *High University* | *College* | *Median* | *Low* |
|---|---|---|---|---|
| Arts and Science | 507 | 439 | 379 | 264 |
| History | 63 | 43 | 27 | 18 |

The study observes that, "The fact that all of the institutions in this group offer what are generally considered to be quality programs suggests that those offering large numbers of courses have the potential for substantial savings through curriculum redesign."

3) **Statistics Related to Faculty**

| | *High* | *Median* | *Low* |
|---|---|---|---|
| Change in percentage of full and associate professors of total faculty—68/69 to 70/71 | +4.9% | +1.4% | -3.0% |
| Tenured faculty as a percent of total faculty | 66% | 46% | 33% |
| Average faculty salary | $14,938 | $12,962 | $12,047 |
| Number FTEF per clerical support personnel | 31.0 | 11.6 | 6.5 |

The study also attempts to assess the *potential* for savings. To arrive at this potential, opportunities are applied to a composite institution formed by compiling data from selected institutions that appear to be representative of the whole group. The projected operating deficit of the composite institution was approximately $1.7 million—or about 4.5 percent of expenditures. If savings opportunities were successfully realized by the composite institutions, such savings would amount to approximately $1.5 million, of which 44 percent, or $660,000, would be attributable to the academic area. This is an indication of the resource impact of decisions on curriculum, staffing, and section sizing.